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AUTHOR Brause, Rita S.
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ABSTRACT

The hypothesized ability of adult native speakers to understand linguistic ambiguity was tested. An approach developed to determine linguistic competence tested the ability of 90 participants in individual interviews to interpret sentences having the potential for multiple interpretations. The hypothesis was not supported by the data. A hierarchy of these abilities, however, did emerge. The observed hierarchy across age (7 years to adult) and education (second grade to college graduate student) included the understanding of: (1) two meanings of a word presented in unambiguous contexts; (2) lexical ambiguity and/or figurative language; (3) surface structure ambiguity and/or multiplicity of pronoun referents; and (4) deep structure ambiguity. (Author/CFM)

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DEVELOPMENTAL ASPECTS OF THE ABILITY TO UNDERSTAND SEMANTIC AMBIGUITY

Rita S. Brause
Fordham University

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American Educational Research Association
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This study deals with an investigation of adult ability to understand aspects of semantic ambiguity. As a corollary, the developing ability of children to understand these same linguistic structures was investigated. Linguistic theories based on the insights of transformational-generative grammarians led by Noam Chomsky (1957), have been concerned with developing rules which account for adult native speakers' intuitions about their language. Abilities imputed to adults include recognizing paraphrases, meaningless sentences, synonymous sentences and ambiguous sentences (Katz, 1972).

For centuries, philosophers and linguists have been hypothesizing the developmental aspects of language acquisition. Based on current linguistic theories it is possible to understand more concretely the complexities of language and to investigate their development. The rules of language, which are tacitly acquired, constitute a grammar of competence or a competence model. Chomsky (1965) notes that grammarians "make a fundamental distinction between competence (the speaker-hearer's knowledge of his language) and performance (the actual use of language in concrete situations)"(p.4).

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Research has been conducted on isolated aspects of semantic development as understanding word meanings (Anglin, 1970; Piaget, 1955; Vygotsky, 1962) and understanding ambiguous sentences (Kessel, 1970; Jurgens, 1971; Shultz & Pilon, 1973). Adult ability to understand ambiguity has been hypothesized. However, there has been no empirical investigation with a cross-section of the adult population to determine its validity. In fact, Carey, Mehler & Bever (1970) excluded six of 80 adult subjects based on those subjects' incorrect paraphrasing of ambiguous sentences, without questioning the universality of the assumed adult understanding.

Therefore, it seemed appropriate to investigate the validity of the imputed adult ability across educational backgrounds, and in addition, to explore the possibility of the presence of a sequential development of this ability among children. It also seemed appropriate to determine the relationship between similar structures which have a potential for multiple interpretations as figurative language, symbolic language, and pronouns with a potential for multiple referents. These structures have not been studied in conjunction with the understanding of lexical, surface structure and deep structure ambiguity. Derwing (1973) noted, 'the hard facts of the matter are that we have very little systematic knowledge about the relative competence of, say, the four-year-old child vis-à-vis the adult"(p.72). A systematic comparison of the semantic development of children, adolescents and adults seemed needed.

In developing an approach to investigate these concerns,

the experimental designs used by Carol Chomsky (1969) and Kessel (1970) were used as models. They adapted to linguistic investigations, Piaget's clinical method. They posed questions in an attempt to determine his thinking, to probe, to have him explain the intent of his responses as clearly as possible. These procedures provided insights into what the child was able to do. Changes in Piagetian research were concerned with semi-standardization of the procedure. The goal of this investigation was to tap the linguistic competence of the 40 adults and 50 children interviewed. All were native speakers of American English.

Participants

Fifty students in attendance at public elementary and secondary schools in New York City were included. Ten students in each of grades two, four, six, eight, and ten were chosen. They were selected based on a teacher-report of the most recently recorded results on reading achievement tests which were available at the interview time; i.e., students whose scores indicated that they were either at grade level or a maximum of one year above grade level on the Metropolitan Achievement Test in Reading were invited to participate.

The remaining 40 participants were chosen to represent a variety of adult educational backgrounds. Ten participants from each of the following groups were included: high school drop-outs; high school graduates; college undergraduate students and graduate students in college.

Method

Individual interviews were conducted in school settings.

Although an informal manner was established, the procedure was standardized as closely as possible. Sentences were selected from previous studies and theoretical treatises. The sequence of sentence presentation is noted in Table 1 with examples of each aspect. The sequence included:

1. one meaning of a word in an unambiguous context
2. a second meaning of the same word in an unambiguous context
3. multiplicity of pronoun referents
4. figurative language
5. symbolic language of proverbs
6. lexical ambiguity
7. surface structure ambiguity
8. deep structure ambiguity

This paradigm was repeated three times, resulting in a total of 24 sentences for each participant to interpret.

To establish a mental set for ambiguity, specific tasks involving this concept, starting with words in isolation (as orange and gold) were discussed at the beginning of the interview. After the concept was conveyed, the sentences were presented in a neutral tone to the participants by playing pre-recorded "endless" audiotapes. Stress and pitch cues which might aid in disambiguation were omitted. The participa[illegible] was requested to explain each sentence. For an interpretation to be considered correct, the participant was required to independently offer paraphrases at any time during the interview which were similar to those agreed on independently by two doctoral candidates in linguistics. When paraphrases were suggested by the interviewer during the first two cycles of the interview, the tape of the

sentence was played again and the participant was asked to tell all of the meanings he would accept for that sentence.

Results

A dichotomous scale based on the acceptablity of independently offered paraphrases was used to note a participant's understanding of multiple meanings of words and sentences. The understanding of a specific aspect of language was operationally established by the meeting of a criterion. To meet the criterion, each individual had to independently offer acceptable explanations for at least two sentences which tested one particular linguistic understanding. The reliability of the scoring was established by requesting two doctoral candidates in linguistics (as in Gleitman & Gleitman, 1970) to independently evaluate the taped interviews of the first three participants. This resulted in a 95.8% index of concurrence which established a high degree of interjudge reliability.

In analyzing the data, an invariant sequence emerged in which one progresses from the ability to understand single meanings of words to understanding deep structure ambiguity. The hierarchy is presented in Table 2. Educational background and age seem to influence the development of these abilities, as indicated by the similarity of abilities of the sixth graders and the high school dropouts. But these do not seem to be the only factors affecting this ability, since these is great variation in abilities among individuals tested. Similar to the findings of Gleitman and Gleitman and Kramer, Koff and Luria (1972), equal competence among adults was not found. When these scores are inspected by group, noting ⅔ or more of the group's ability to meet the established criterion, a Guttman-like scale emerges in which the ability to understand more complex structures seems dependent on the ability to understand simpler structures (See Table 3.)

Based on this scaling, the stage sequence emerged. A further analysis of the data following each participant's abilities suggests the stages of development elaborated in Table 4.

An exception to the developmental sequence which was investigated is the understanding of symbolic language of proverbs as tested herein, which seems to develop independently of one's ability to understand the other aspects studied. These stages may be compared with Piaget's stage theory in which the sequence of cognitive development is believed to be invariant and independent of age.

Discussion

Of the 90 participants, 87 demonstrated an invariant order in the understanding of the aspects of language studied. That is, each met the criterion on at least one aspect of each stage before proceeding to the next stage, as can be noted in Table 3 and 4. Those individuals who understood both aspects of either Stage 2 or 3 were more likely to progress to a higher stage than those who only demonstrated an understanding of one aspect of either of these stages, as can be noted in Table 4. As a basis for determining the reliability of the results, a coefficient of reproducibility produced a finding of .97 which strongly supports the revised hypothesized sequence. In addition, the hypothesized presence of a hierarchical or stage theory in the acquisition of the ability to understand the aspects of language studied, which is similar to that of Piaget's, was supported.

The hypothesized development from understanding smaller to larger linguistic units (as in the development of understanding from lexical ambiguity to deep structure ambiguity) was confirmed by this investigation. In addition, the observed relationship between multiplicity of pronoun referents and surface structure ambiguity seems to suggest a similarity in the chunking of these

linguistic structures. Piaget's suggested development from syncretism to analysis was supported in the observed developmental sequence of the interpretation of figurative and symbolic language. Individuals at the earliest stages of linguistic development interpreted these sentences literally. Interpretive explanations were offered by those with more advanced development. At the highest levels, individuals were able to note the relationship between both levels of interpretation. This is consistent with the findings of Asch and Nerlove (1960) who noted that children's understanding developed from meanings related to physical referents of a word to their psychological meanings, and then finally to relating the two meanings.

Although the public school population was homogeneous based on recorded reading grades on the Metropolitan Achievement Test, the assumed homogeneity was not reflected in the participants' abilities to understand aspects of language studied.

It is apparent that not all the participants in any group met the criterion in all aspects, suggesting a range in these abilities, which is not necessarily related to age or educational background. Perhaps there are other factors. Certainly one's formal educational level is not the only prerequisite for attaining these abilities, i.e., it is seemingly neither sufficient nor necessary but helpful for the development of these abilities.

A sequential order of language acquisition has been demonstrated in understanding structures which have the potential for multiple interpretations. Equal competence within age groups has not been obtained, even among the adult groups tested. However, it seems possible to assess an individual's linguistic abilities, regardless of age. Then, once the present level has

been determined, the order of future development can be hypothesized.

Thank You

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DEVELOPMENTAL ASPECTS OF THE ABILITY TO UNDERSTAND SEMANTIC AMBIGUITY

Rita S. Brause
Fordham University
School of Education

TABLE 1

SEQUENCE OF PRESENTATION OF SENTENCE TYPES

1. One meaning of a word in an unambiguous context

   The color of her dress was such a light pink that it looked like white.

2. A second meaning of the same word in an unambiguous context

   I may need my car to carry the package because the package is not as light as I thought it would be.

3. Multiplicity of pronoun referents

   John persuaded Bill that he should leave.

4. Figurative language

   He is tied up at a meeting.

5. Symbolic language of proverbs

   Still water runs deep.

6. Lexical ambiguity

   The man wore a light suit.

7. Surface structure ambiguity

   They fed her dog biscuits.

8. Deep structure ambiguity

   The mayor will ask the police to stop drinking.

Based on a doctoral dissertation completed at New York University, Professor John S. Mayher, chairman.

TABLE 2

RELATIONSHIP BETWEEN EDUCATIONAL BAKCGROUND AND SEMANTIC DEVELOPMENT

Semantic Development	Educational Background									Total
	2nd-4th Gr. N=10	4th Gr. N=10	6th Gr. N=10	8th Gr. N=10	10th Gr. N=10	H.S. D.O. N=10	HSG N=10	Col. Und. N=10	Col. Grad. N=10	N=90
STAGE ONE										
Two meanings of a Word in Unambiguous Contexts	10	10	10	10	10	10	10	10	10	90
STAGE TWO										
Lexical Ambiguity	2	5	8	8	9	5	5	9	9	60
Figurative Language	1	6	7	7	10	5	10	10	10	66
STAGE THREE										
Surface Structure Ambiguity	2	3	3	5	10	4	8	9	10	54
Multiplicity of Pronoun Referents	0	1	4	2	8	4	8	9	10	46
STAGE FOUR										
Deep Structure Ambiguity	0	0	2	2	6	2	6	4	7	29
INDEPENDENT STAGE										
Symbolic Language	0	0	1	4	5	1	10	10	9	40

Note. Numbers represent participants who met the criterion in each aspect of semantic development.

TABLE 3

RELATIONSHIP BETWEEN EDUCATIONAL BACKGROUND AND ABILITY TO UNDERSTAND MULTIPLE MEANINGS OF WORDS AND SENTENCES[a]

Task	Educational Background								
	2nd Gr.	4th Gr.	6th Gr.	H.S. D.O.	8th Gr.	Col. Und.	10th Gr.	HSG	Col. Gr.St.
Single Meaning	X	X	X	X	X	X	X	X	X
Figurative Language		X	X	X	X	X	X	X	X
Lexical Ambiguity		X	X	X	X	X	X	X	X
Surface Structure Ambiguity					X	X	X	X	X
Multiplicity of Pronoun Referents						X	X	X	X
Symbolic Language						X	X	X	X
Deep Structure Ambiguity							X	X	X

[a] Based on achievement of the criterion by a minimum of 50% of participants in the group.

X= meeting of the criterion by at least 50% of the group.

Table 4

Progression by Participants on the Newly Hypothesized Hierarchy

Stage		Number who Reached This Stage
STAGE ONE Single Meanings of Words in Two Unambiguous Contexts	Single Meanings (90) Stop (16)	90
STAGE TWO Figurative Language and Lexical Ambiguity	Lexical Ambiguity (6) Figurative Language (12) Lexical Ambiguity and Figurative Language (54) Stop (5) Stop (4) Stop (6)	74[a]
STAGE THREE Surface Structure Ambiguity (SSA) and Multiplicity of Pronoun Referents (MPR)	SSA MPR (1) SSA & MPR SSA (1) MPR (2) SSA & MPR (5) SSA (8) MPR (2) SSA & MPR (37) Stop Stop (1) Stop Stop Stop (1) Stop (1) Stop (6) Stop (2) Stop (17)	57[b]
STAGE FOUR Deep Structure Ambiguity (DSA)	DSA DSA DSA DSA (1) DSA (1) DSA (4) DSA (2) DSA DSA (20)	28

[a] Two participants met the criterion on stage one, did not on stage two, yet met the criterion on stage three.

[b] One participant met the criterion on stages one and two, skipped stage three, and met the criterion on stage four.